

60020830-0003.ST25  
SEQUENCE LISTING

<110> Wun, Tze-Chein  
Wun, Tze-Chein  
<120> Novel Recombinant Anticoagulant Proteins  
<130> 60020830-0003  
<160> 41  
<170> PatentIn version 3.1  
<210> 1  
<211> 382  
<212> PRT  
<213> Artificial  
<220>  
<223> Fusion protein: human-derived ANV with TAP  
<400> 1

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Asp Ser Asn Glu Gly Gly Glu Arg Ala Tyr Phe Arg Asn Gly Lys Gly  
20 25 30

Gly Cys Asp Ser Phe Trp Ile Cys Pro Glu Asp His Thr Gly Ala Asp  
35 40 45

Tyr Tyr Ser Ser Tyr Asn Asp Cys Phe Asn Ala Cys Ile Gly Ser Ala  
50 55 60

Gln Val Leu Arg Gly Thr Val Thr Asp Phe Pro Gly Phe Asp Glu Arg  
65 70 75 80

Ala Asp Ala Glu Thr Leu Arg Lys Ala Met Lys Gly Leu Gly Thr Asp  
85 90 95

Glu Glu Ser Ile Leu Thr Leu Leu Thr Ser Arg Ser Asn Ala Gln Arg  
100 105 110

Gln Glu Ile Ser Ala Ala Phe Lys Thr Leu Phe Gly Arg Asp Leu Leu  
115 120 125

Asp Asp Leu Lys Ser Glu Leu Thr Gly Lys Phe Glu Lys Leu Ile Val  
130 135 140

Ala Leu Met Lys Pro Ser Arg Leu Tyr Asp Ala Tyr Glu Leu Lys His  
145 150 155 160

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Ala Leu Lys Gly Ala Gly Thr Asn Glu Lys Val Leu Thr Glu Ile Ile  
165 170 175

Ala Ser Arg Thr Pro Glu Glu Leu Arg Ala Ile Lys Gln Val Tyr Glu  
180 185 190

Glu Glu Tyr Gly Ser Ser Leu Glu Asp Asp Val Val Gly Asp Thr Ser  
195 200 205

Gly Tyr Tyr Gln Arg Met Leu Val Val Leu Leu Gln Ala Asn Arg Asp  
210 215 220

Pro Asp Ala Gly Ile Asp Glu Ala Gln Val Glu Gln Asp Ala Gln Ala  
225 230 235 240

Leu Phe Gln Ala Gly Glu Leu Lys Trp Gly Thr Asp Glu Glu Lys Phe  
245 250 255

Ile Thr Ile Phe Gly Thr Arg Ser Val Ser His Leu Arg Lys Val Phe  
260 265 270

Asp Lys Tyr Met Thr Ile Ser Gly Phe Gln Ile Glu Glu Thr Ile Asp  
275 280 285

Arg Glu Thr Ser Gly Asn Leu Glu Gln Leu Leu Leu Ala Val Val Lys  
290 295 300

Ser Ile Arg Ser Ile Pro Ala Tyr Leu Ala Glu Thr Leu Tyr Tyr Ala  
305 310 315 320

Met Lys Gly Ala Gly Thr Asp Asp His Thr Leu Ile Arg Val Met Val  
325 330 335

Ser Arg Ser Glu Ile Asp Leu Phe Asn Ile Arg Lys Glu Phe Arg Lys  
340 345 350

Asn Phe Ala Thr Ser Leu Tyr Ser Met Ile Lys Gly Asp Thr Ser Gly  
355 360 365

Asp Tyr Lys Lys Ala Leu Leu Leu Leu Ala Gly Glu Asp Asp  
370 375 380

<210> 2  
<211> 378  
<212> PRT  
<213> Artificial

<220>  
<223> Fusion protein: human-derived ANV with artificial 6L15 (a variant  
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of naturally occurring bovine pancreatic trypsin inhibitor)

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Arg Ala Asp Ala Glu Thr Leu Arg Lys Ala Met Lys Gly Leu Gly Thr  
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Asp Glu Glu Ser Ile Leu Thr Leu Leu Thr Ser Arg Ser Asn Ala Gln  
35 40 45

Arg Gln Glu Ile Ser Ala Ala Phe Lys Thr Leu Phe Gly Arg Asp Leu  
50 55 60

Leu Asp Asp Leu Lys Ser Glu Leu Thr Gly Lys Phe Glu Lys Leu Ile  
65 70 75 80

Val Ala Leu Met Lys Pro Ser Arg Leu Tyr Asp Ala Tyr Glu Leu Lys  
85 90 95

His Ala Leu Lys Gly Ala Gly Thr Asn Glu Lys Val Leu Thr Glu Ile  
100 105 110

Ile Ala Ser Arg Thr Pro Glu Glu Leu Arg Ala Ile Lys Gln Val Tyr  
115 120 125

Glu Glu Glu Tyr Gly Ser Ser Leu Glu Asp Asp Val Val Gly Asp Thr  
130 135 140

Ser Gly Tyr Tyr Gln Arg Met Leu Val Val Leu Leu Gln Ala Asn Arg  
145 150 155 160

Asp Pro Asp Ala Gly Ile Asp Glu Ala Gln Val Glu Gln Asp Ala Gln  
165 170 175

Ala Leu Phe Gln Ala Gly Glu Leu Lys Trp Gly Thr Asp Glu Glu Lys  
180 185 190

Phe Ile Thr Ile Phe Gly Thr Arg Ser Val Ser His Leu Arg Lys Val  
195 200 205

Phe Asp Lys Tyr Met Thr Ile Ser Gly Phe Gln Ile Glu Glu Thr Ile  
210 215 220

Asp Arg Glu Thr Ser Gly Asn Leu Glu Gln Leu Leu Ala Val Val  
225 230 235 240

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Lys Ser Ile Arg Ser Ile Pro Ala Tyr Leu Ala Glu Thr Leu Tyr Tyr  
245 250 255

Ala Met Lys Gly Ala Gly Thr Asp Asp His Thr Leu Ile Arg Val Met  
260 265 270

Val Ser Arg Ser Glu Ile Asp Leu Phe Asn Ile Arg Lys Glu Phe Arg  
275 280 285

Lys Asn Phe Ala Thr Ser Leu Tyr Ser Met Ile Lys Gly Asp Thr Ser  
290 295 300

Gly Asp Tyr Lys Lys Ala Leu Leu Leu Leu Ala Gly Glu Asp Asp Met  
305 310 315 320

His Pro Asp Phe Cys Leu Glu Pro Pro Tyr Asp Gly Pro Cys Arg Ala  
325 330 335

Leu His Leu Arg Tyr Phe Tyr Asn Ala Lys Ala Gly Leu Cys Gln Thr  
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Phe Tyr Tyr Gly Gly Cys Leu Ala Lys Arg Asn Asn Phe Glu Ser Ala  
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Glu Asp Cys Met Arg Thr Cys Gly Gly Ala  
370 375

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<211> 376  
<212> PRT  
<213> Artificial

<220>  
<223> Fusion protein: human-derived ANV with synthetic human K-APP

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20 25 30

Asp Glu Glu Ser Ile Leu Thr Leu Leu Thr Ser Arg Ser Asn Ala Gln  
35 40 45

Arg Gln Glu Ile Ser Ala Ala Phe Lys Thr Leu Phe Gly Arg Asp Leu  
50 55 60

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Leu Asp Asp Leu Lys Ser Glu Leu Thr Gly Lys Phe Glu Lys Leu Ile  
65 70 75 80

Val Ala Leu Met Lys Pro Ser Arg Leu Tyr Asp Ala Tyr Glu Leu Lys  
85 90 95

His Ala Leu Lys Gly Ala Gly Thr Asn Glu Lys Val Leu Thr Glu Ile  
100 105 110

Ile Ala Ser Arg Thr Pro Glu Glu Leu Arg Ala Ile Lys Gln Val Tyr  
115 120 125

Glu Glu Glu Tyr Gly Ser Ser Leu Glu Asp Asp Val Val Gly Asp Thr  
130 135 140

Ser Gly Tyr Tyr Gln Arg Met Leu Val Val Leu Leu Gln Ala Asn Arg  
145 150 155 160

Asp Pro Asp Ala Gly Ile Asp Glu Ala Gln Val Glu Gln Asp Ala Gln  
165 170 175

Ala Leu Phe Gln Ala Gly Glu Leu Lys Trp Gly Thr Asp Glu Glu Lys  
180 185 190

Phe Ile Thr Ile Phe Gly Thr Arg Ser Val Ser His Leu Arg Lys Val  
195 200 205

Phe Asp Lys Tyr Met Thr Ile Ser Gly Phe Gln Ile Glu Glu Thr Ile  
210 215 220

Asp Arg Glu Thr Ser Gly Asn Leu Glu Gln Leu Leu Leu Ala Val Val  
225 230 235 240

Lys Ser Ile Arg Ser Ile Pro Ala Tyr Leu Ala Glu Thr Leu Tyr Tyr  
245 250 255

Ala Met Lys Gly Ala Gly Thr Asp Asp His Thr Leu Ile Arg Val Met  
260 265 270

Val Ser Arg Ser Glu Ile Asp Leu Phe Asn Ile Arg Lys Glu Phe Arg  
275 280 285

Lys Asn Phe Ala Thr Ser Leu Tyr Ser Met Ile Lys Gly Asp Thr Ser  
290 295 300

Gly Asp Tyr Lys Lys Ala Leu Leu Leu Leu Ala Gly Glu Asp Asp Glu  
305 310 315 320

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Val Cys Ser Glu Gln Ala Glu Thr Gly Pro Cys Arg Ala Met Ile Ser  
325 330 335

Arg Trp Tyr Phe Asp Val Thr Glu Gly Lys Cys Ala Pro Phe Phe Tyr  
340 345 350

Gly Gly Cys Gly Gly Asn Arg Asn Asn Phe Asp Thr Glu Glu Tyr Cys  
355 360 365

Met Ala Val Cys Gly Ser Ala Ile  
370 375

<210> 4  
<211> 459  
<212> PRT  
<213> Artificial

<220>  
<223> Fusion protein: human-derived ANV with KK-TFPI (a human sequence)

<400> 4

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Arg Ala Asp Ala Glu Thr Leu Arg Lys Ala Met Lys Gly Leu Gly Thr  
20 25 30

Asp Glu Glu Ser Ile Leu Thr Leu Leu Thr Ser Arg Ser Asn Ala Gln  
35 40 45

Arg Gln Glu Ile Ser Ala Ala Phe Lys Thr Leu Phe Gly Arg Asp Leu  
50 55 60

Leu Asp Asp Leu Lys Ser Glu Leu Thr Gly Lys Phe Glu Lys Leu Ile  
65 70 75 80

Val Ala Leu Met Lys Pro Ser Arg Leu Tyr Asp Ala Tyr Glu Leu Lys  
85 90 95

His Ala Leu Lys Gly Ala Gly Thr Asn Glu Lys Val Leu Thr Glu Ile  
100 105 110

Ile Ala Ser Arg Thr Pro Glu Glu Leu Arg Ala Ile Lys Gln Val Tyr  
115 120 125

Glu Glu Glu Tyr Gly Ser Ser Leu Glu Asp Asp Val Val Gly Asp Thr  
130 135 140

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Ser Gly Tyr Tyr Gln Arg Met Leu Val Val Leu Leu Gln Ala Asn Arg  
145 150 155 160

Asp Pro Asp Ala Gly Ile Asp Glu Ala Gln Val Glu Gln Asp Ala Gln  
165 170 175

Ala Leu Phe Gln Ala Gly Glu Leu Lys Trp Gly Thr Asp Glu Glu Lys  
180 185 190

Phe Ile Thr Ile Phe Gly Thr Arg Ser Val Ser His Leu Arg Lys Val  
195 200 205

Phe Asp Lys Tyr Met Thr Ile Ser Gly Phe Gln Ile Glu Glu Thr Ile  
210 215 220

Asp Arg Glu Thr Ser Gly Asn Leu Glu Gln Leu Leu Leu Ala Val Val  
225 230 235 240

Lys Ser Ile Arg Ser Ile Pro Ala Tyr Leu Ala Glu Thr Leu Tyr Tyr  
245 250 255

Ala Met Lys Gly Ala Gly Thr Asp Asp His Thr Leu Ile Arg Val Met  
260 265 270

Val Ser Arg Ser Glu Ile Asp Leu Phe Asn Ile Arg Lys Glu Phe Arg  
275 280 285

Lys Asn Phe Ala Thr Ser Leu Tyr Ser Met Ile Lys Gly Asp Thr Ser  
290 295 300

Gly Asp Tyr Lys Lys Ala Leu Leu Leu Leu Ala Gly Glu Asp Asp Met  
305 310 315 320

His Ser Phe Cys Ala Phe Lys Ala Asp Asp Gly Pro Cys Lys Ala Ile  
325 330 335

Met Lys Arg Phe Phe Asn Ile Phe Thr Arg Gln Cys Glu Glu Phe  
340 345 350

Ile Tyr Gly Gly Cys Glu Gly Asn Gln Asn Arg Phe Glu Ser Leu Glu  
355 360 365

Glu Cys Lys Lys Met Cys Thr Arg Asp Asn Ala Asn Arg Ile Ile Lys  
370 375 380

Thr Thr Leu Gln Gln Glu Lys Pro Asp Phe Cys Phe Leu Glu Glu Asp  
385 390 395 400

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Pro Gly Ile Cys Arg Gly Tyr Ile Thr Arg Tyr Phe Tyr Asn Asn Gln  
 405 410 415

Thr Lys Gln Cys Glu Arg Phe Lys Tyr Gly Gly Cys Leu Gly Asn Met  
 420 425 430

Asn Asn Phe Glu Thr Leu Glu Glu Cys Lys Asn Ile Cys Glu Asp Gly  
 435 440 445

Pro Asn Gly Phe Gln Val Asp Asn Tyr Gly Thr  
 450 455

<210> 5  
 <211> 1380  
 <212> DNA  
 <213> Artificial

<220>  
 <223> Fusion gene of human-derived ANV with TAP

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gaaactcttc ggaaggctat gaaaggcttg ggcacagatg aggagagcat cctgactctg	120
ttgacatccc gaagtaatgc tcagcgccag gaaatctctg cagctttaa gactctgttt	180
ggcaggatc ttctggatga cctgaaatca gaactaactg gaaaaatttga aaaattaatt	240
gtggctctga taaaacccttc tcggctttat gatgctttag aactgaaaca tgccttgaag	300
ggagctggaa caaatgaaaaa agtactgaca gaaattatttgc ttcaaggac acctgaagaa	360
ctgagagcca tcaaacaagt ttatgaagaa gaatatggct caagccttgg aatgacgtg	420
gtggggaca cttcagggttta ctaccagcgg atgttggatgg ttctccttca ggctaacaga	480
gaccctgatg ctggaaatttga tgaagctcaa gttgaacaag atgctcaggc tttatttcag	540
gctggagaac taaaatgggg gacagatgaa gaaaagtttca tcaccatctt tggAACACGA	600
agtgtgtctc atttgagaaa ggtgttgac aagtacatgaa ctatatcagg atttcaaatt	660
gagggaaacca ttgaccgcga gacttctggc aatttagagc aactactcct tgctgttgg	720
aaatctatttca gaagtataacc tgcctaccc ttgcagacccc tctattatgc tatgaaggaa	780
gctggacacat atgatcatac cctcatcaga gtcatggttt ccaggagtga gattgatctg	840
tttaacatca ggaaggagtt taggaagaat tttgccacct ctctttatttca catgattaag	900
ggagatacat ctggggacta taagaaagct cttctgctgc tcgctggaga agatgacatg	960
cattcattttt gtgcattcaa ggcggatgtt ggcctatgtt aagcaatcat gaaaagattt	1020
ttcttcaata ttttcaactcg acagtgcgaa gaattttat atggggatgt tgaaggaaat	1080
cagaatcgat ttgaaagtctt ggaagagtgc aaaaaatgtt gtacaagaga taatgcaaac	1140

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gaacgtttca agtatggtgg	atcgctggc aatatgaaca	atttgagac actggaagaa	1320
tgcaagaaca tttgtgaaga	tggtccgaat ggtttccagg	tggataattt tggAACCTAA	1380

<210> 6  
<211> 1137  
<212> DNA  
<213> Artificial

<220>  
<223> Fusion gene of human-derived ANV with artificial 6L15, which is a variant of naturally occurring bovine pancreatic trypsin inhibitor or

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ttgacatccc gaagtaatgc	tcaagcggccag gaaatctctg cagctttaa gactctgttt	180
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gtggctctga taaaacccctc	tcggctttat gatgctttag aactgaaaca tgccttgaag	300
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gctggagaac taaaatgggg	gacagatgaa gaaaagttt tcaccatctt tggAACACGA	600
agtgtgtctc atttggaaaa	ggtgtttgac aagtacatga ctatatcagg atttcaaatt	660
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catccggact tctgccttgg	accgcgtac gacggccgt gccgtgcct gcacccgcgt	1020
tacttctaca atgcaaaggc	aggcctgtgt cagaccttct actacggcgg ttgcctggct	1080
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<210> 7  
<211> 1131  
<212> DNA

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&lt;213&gt; Artificial

<220>  
<223> Fusion gene of human-derived ANV with synthetic human K-APP gene

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ttgacatccc gaagtaatgc tcagcggcag gaaatctctg cagttttaa gactctgttt	180
ggcagggttc ttctggatga cctgaaatca gaactaactg gaaaatttga aaaattaatt	240
gtggctctga taaaaccctc tcggctttat gatgctttag aactgaaaca tgccttgaag	300
ggagctggaa caaatgaaaa agtactgaca gaaatttattt gttcaaggac acctgaagaa	360
ctgagagcca tcaaacaagt ttatgaagaa gaatatggct caagcctgga agatgacgtg	420
gtgggggaca cttcagggtt ctaccagcgg atgttgggtt ttctccttca ggctaacaga	480
gaccctgatg ctggaaatttga tgaagctcaa gttgaacaag atgctcaggc tttattttag	540
gctggagaac taaaatgggg gacagatgaa gaaaagtttta tcaccatctt tggAACACGA	600
agtgtgtctc attttagaaaa ggtgtttgac aagtacatga ctatattcagg atttcaaatt	660
gaggaaacca ttgaccgcga gacttctggc aatttagagc aactactcct tgctgttgg	720
aaatctatttca gaagtataacc tgcctacctt gcagagaccc tctattatgc tatgaaggaa	780
gctggacag atgatcatac cctcatcaga gtcattttt ccaggagtga gattgatctg	840
tttaacatca ggaaggagtt taggaagaat tttgccacct ctctttatttca catgattaag	900
ggagatacat ctggggacta taagaaagct cttctgctgc tcgctggaga agatgacgag	960
gtttgttctg agcaagctga gactggcata tgttagagcta tgatttcttag atggacttc	1020
gacgttactg agggtaagtg tgctccattt tcctacgggtt gttgtgggtt taacagaaac	1080
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&lt;210&gt; 8

&lt;211&gt; 1380

&lt;212&gt; DNA

&lt;213&gt; Artificial

<220>  
<223> Fusion gene of human-derived ANV with KK-TFPI, which is a human sequence

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ttgacatccc gaagtaatgc tcagcggcag gaaatctctg cagttttaa gactctgttt	180
ggcagggttc ttctggatga cctgaaatca gaactaactg gaaaatttga aaaattaatt	240

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ctgagagcca	tcaaacaagt	ttatgaagaa	gaatatggct	caagcctgga	agatgacgtg	420
gtgggggaca	cttcagggtt	ctaccagcg	atgttggtgg	ttctccttca	ggctaacaga	480
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cagaatcgat	ttgaaagtct	ggaagagtgc	aaaaaaatgt	gtacaagaga	taatgcaaac	1140
aggattataa	agacaacatt	gcaacaagaa	aagccagatt	tctgcttttt	ggaagaagat	1200
ccttggatat	gtcgaggta	tattaccagg	tattttata	acaatcagac	aaaacagtgt	1260
gaacgtttca	agtatggtgg	atcgctggc	aatatgaaca	atttgagac	actggaagaa	1320
tgcaagaaca	tttgtgaaga	ttgtccgaat	ggtttccagg	tggataat	tggAACCTAA	1380

<210> 9  
 <211> 960  
 <212> DNA  
 <213> Homo sapiens

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	ttgacatccc	gaagtaatgc	tcagcgcag	gaaatctctg	cagctttaa	gactctgttt	180
	ggcagggatc	ttctggatga	cctgaaatca	gaactaactg	gaaaatttga	aaaattaatt	240
	gtggctctga	tcaaaccctc	tcggctttat	gatgcttatg	aactgaaaca	tgccttgaag	300
	ggagctggaa	caaataaaaa	agtactgaca	gaaattattt	cttcaaggac	acctgaagaa	360
	ctgagagcca	tcaaacaagt	ttatgaagaa	gaatatggct	caagcctgga	agatgacgtg	420
	gtgggggaca	cttcagggtt	ctaccagcg	atgttggtgg	ttctccttca	ggctaacaga	480
	gaccctgatg	cttggaaattt	tgaagctaa	gttgaacaag	atgctcaggc	tttatttcag	540

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gaggaaacca	ttgaccgcga	gacttctggc	aatttagagc	aactactcct	tgctgttg	720
aaatctattc	gaagtatacc	tgcctacctt	gcagagaccc	tctattatgc	tatgaaggga	780
gctgggacag	atgatcatac	cctcatcaga	gtcatggttt	ccaggagtga	gattgatctg	840
tttaacatca	ggaaggagtt	taggaagaat	tttgccacct	ctctttattc	catgattaag	900
ggagatacat	ctggggacta	taagaaagct	cttctgctgc	tctgtggaga	agatgactaa	960

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 <211> 319  
 <212> PRT  
 <213> Homo sapiens

<400> 10

Ala Gln Val Leu Arg Gly Thr Val Thr Asp Phe Pro Gly Phe Asp Glu  
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 35 40 45

Arg Gln Glu Ile Ser Ala Ala Phe Lys Thr Leu Phe Gly Arg Asp Leu  
 50 55 60

Leu Asp Asp Leu Lys Ser Glu Leu Thr Gly Lys Phe Glu Lys Leu Ile  
 65 70 75 80

Val Ala Leu Met Lys Pro Ser Arg Leu Tyr Asp Ala Tyr Glu Leu Lys  
 85 90 95

His Ala Leu Lys Gly Ala Gly Thr Asn Glu Lys Val Leu Thr Glu Ile  
 100 105 110

Ile Ala Ser Arg Thr Pro Glu Glu Leu Arg Ala Ile Lys Gln Val Tyr  
 115 120 125

Glu Glu Glu Tyr Gly Ser Ser Leu Glu Asp Asp Val Val Gly Asp Thr  
 130 135 140

Ser Gly Tyr Tyr Gln Arg Met Leu Val Val Leu Leu Gln Ala Asn Arg  
 145 150 155 160

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Asp Pro Asp Ala Gly Ile Asp Glu Ala Gln Val Glu Gln Asp Ala Gln  
 165 170 175

Ala Leu Phe Gln Ala Gly Glu Leu Lys Trp Gly Thr Asp Glu Glu Lys  
 180 185 190

Phe Ile Thr Ile Phe Gly Thr Arg Ser Val Ser His Leu Arg Lys Val  
 195 200 205

Phe Asp Lys Tyr Met Thr Ile Ser Gly Phe Gln Ile Glu Glu Thr Ile  
 210 215 220

Asp Arg Glu Thr Ser Gly Asn Leu Glu Gln Leu Leu Ala Val Val  
 225 230 235 240

Lys Ser Ile Arg Ser Ile Pro Ala Tyr Leu Ala Glu Thr Leu Tyr Tyr  
 245 250 255

Ala Met Lys Gly Ala Gly Thr Asp Asp His Thr Leu Ile Arg Val Met  
 260 265 270

Val Ser Arg Ser Glu Ile Asp Leu Phe Asn Ile Arg Lys Glu Phe Arg  
 275 280 285

Lys Asn Phe Ala Thr Ser Leu Tyr Ser Met Ile Lys Gly Asp Thr Ser  
 290 295 300

Gly Asp Tyr Lys Lys Ala Leu Leu Leu Leu Cys Gly Glu Asp Asp  
 305 310 315

<210> 11

<211> 33 ..

<212> DNA

<213> Artificial

<220>

<223> ANV reverse primer

<400> 11

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33

<210> 12

<211> 31

<212> DNA

<213> Artificial

<220>

<223> ANV forward primer

<400> 12

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31

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<210> 13  
<211> 32  
<212> DNA  
<213> Artificial

<220>  
<223> Synthetic oligonucleotide used to generate ANV cDNA mutation of Cys-to-Ala at position 315

<400> 13  
cgtgacatgc atgtcatctt ctccagcgag ca 32

<210> 14  
<211> 960  
<212> DNA  
<213> Artificial

<220>  
<223> Sequence encoding human ANV with Cys-to-Ala mutation at position 315

<400> 14  
gcacagggttc tcagaggcac tgtgactgac ttccctggat ttgatgagcg ggctgatgca 60  
gaaactcttc ggaaggctat gaaaggcttg ggcacagatg aggagagcat cctgactctg 120  
ttgacatccc gaagtaatgc tcagcgccag gaaatctctg cagctttaa gactctgttt 180  
ggcagggatc ttctggatga cctgaaatca gaactaactg gaaaatttga aaaattaatt 240  
gtggctctga taaaacccctc tcggctttat gatgctttagt aactgaaaca tgccttgaag 300  
ggagctggaa caaatgaaaa agtactgaca gaaatttattg cttcaaggac acctgaägaa 360  
ctgagagcca tcaaacaagt ttatgaagaa gaatatggct caagcctgga agatgacgtg 420  
gtgggggaca cttcagggtta ctaccagcgg atgttgggtgg ttcccttca ggctaacacaga 480  
gaccctgatg ctggaattga tgaagctcaa gttgaacaag atgctcaggc tttatccatcag 540  
gctggagaac taaaatgggg gacagatgaa gaaaagtttca caccatctt tggaacacgaa 600  
agtgtgtctc atttgagaaa ggtgttgac aagtacatga ctatatcagg atttcaaatt 660  
gaggaaacca ttgaccgcga gacttctggc aatttagagc aactactcct tgctgttg 720  
aaatctatttca gaagtataacc tgcctacctt gcagagaccc tctattatgc tatgaaggaa 780  
gctgggacag atgatcatac cctcatcaga gtcatggttt ccaggagtga gattgatctg 840  
tttaacatca ggaaggagtt taggaagaat tttgccacct ctcttatttc catgattaag 900  
ggagatacat ctggggacta taagaaagct cttctgctgc tcgctggaga agatgactaa 960

<210> 15  
<211> 64  
<212> DNA  
<213> Artificial

<220>

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<223> Synthetic oligonucleotide, first of three forward primers used to generate recombinant 6L15 gene

<400> 15  
tccggacttc tgccctggaac cgccgtacga cggtccgtgc cgtgctctgc acctgcgtta 60  
cttc 64

<210> 16  
<211> 60  
<212> DNA  
<213> Artificial

<220>  
<223> Synthetic oligonucleotide, second of three forward primers used to generate recombinant 6L15

<400> 16  
tacaatgcaa aggccggct gtgtcagacc ttctactacg gcgggtgcct ggctaagcgt 60

<210> 17  
<211> 50  
<212> DNA  
<213> Artificial

<220>  
<223> Synthetic oligonucleotide, third of three forward primers used to generate recombinant 6L15 gene

<400> 17  
aacaacttcg aatccgcgga acactgcattg cgtactttgcg gtgggtgccta 50

<210> 18  
<211> 63  
<212> DNA  
<213> Artificial

<220>  
<223> Synthetic oligonucleotide, first of three reverse primers used to generate recombinant 6L15 gene

<400> 18  
acgcagggtgc agagcacggc acggaccgtc gtacggcggt tccaggcaga agtccggatg 60  
cat 63

<210> 19  
<211> 60  
<212> DNA  
<213> Artificial

<220>  
<223> Synthetic oligonucleotide, second of three reverse primers used to generate recombinant 6L15 gene

<400> 19  
agccaggcaa ccgcccgtagt agaaggctcg acacaggcct gccttgcatt tgtagaagta 60

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<210> 20  
<211> 60  
<212> DNA  
<213> Artificial  
  
<220>  
<223> Synthetic oligonucleotide, third of three reverse primers used to generate recombinant 6L15 gene  
  
<400> 20  
agcttaagca ccaccgcaag tacgcattgca gtctccgcg gattcgaagt tgttacgctt 60  
  
<210> 21  
<211> 177  
<212> DNA  
<213> Artificial  
  
<220>  
<223> synthetic 6L15 gene  
  
<400> 21  
gctccggact tctgcctgga accggccgtac gacgggtccgt gccgtgctct gcacctgcgt 60  
tacttctaca atgcaaaggc agggctgtgt cagacaccccttactacacggcgg ttgcctggct 120  
aagcgtaaca acttcgaatc cgccgaagac tgcattgcgtt cttgcgggtgg tgcttaa 177  
  
<210> 22  
<211> 186  
<212> DNA  
<213> Artificial  
  
<220>  
<223> synthetic, derived from Ornithodoros moubata gene  
  
<400> 22  
gcttacaacc gtctgtcat caaaccggcgt gactggatcg acgaatgcga ctccaaacgaa 60  
ggtgtgaac gtgcttactt ccgtaacgggt aaaggtggtt gcgactcctt ctggatctgc 120  
ccggaagacc acaccgggtgc tgactactac tcctccattacc gtgactgctt caacgcttgc 180  
atctaa 186  
  
<210> 23  
<211> 122  
<212> DNA  
<213> Artificial  
  
<220>  
<223> forward synthetic oligonucleotide for generating synthetic K-APP gene with flanking sequences  
  
<400> 23  
ggccctaccc cacagatacg gagttgccac cactgaaact tgaggttgg agagagggtt 60  
gttctgagca agctgagact ggtccatgta gagctatgat ttcttagatgg tacttcgacg 120  
tt 122

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<210> 24  
<211> 117  
<212> DNA  
<213> Artificial

<220>  
<223> forward synthetic oligonucleotide for generating synthetic K-APP gene with flanking sequences

<400> 24  
actgagggtta agtgtgctcc attttctac ggtggttgtg gtggtaacag aaacaacttc . 60  
gacactgagg agtactgtat ggctgtttgt ggttctgcta tttaaatgca ttgatga 117

<210> 25  
<211> 124  
<212> DNA  
<213> Artificial

<220>  
<223> reverse synthetic oligonucleotide for generating synthetic K-APP gene with flanking sequences

<400> 25  
ctcagtaacg tcgaagtacc atctagaaat catagctcta catggaccag tctcagcttg 60  
ctcagaacaa acctctctaa caacctcaag tttcagtggg ggcaactccg tatctgtggg 120  
gtag 124

<210> 26  
<211> 115  
<212> DNA  
<213> Artificial

<220>  
<223> reverse synthetic oligonucleotide for generating synthetic K-APP gene with flanking sequences

<400> 26  
agcttcatca atgcatttaa atagcagaac cacaaacagc catacagtag tcctcagtgt 60  
cgaaggttt cttttacca ccacaaccac cgtagaagaa tggagcacac ttacc 115

<210> 27  
<211> 174  
<212> DNA  
<213> Artificial

<220>  
<223> synthetic K-APP gene, derived from human sequence

<400> 27  
gagggtttttt ctgagcaagc tgagactggc ccatgttagag ctatgatttc tagatggtag 60  
ttcgacgtta ctgagggtaa gtgtgctcca ttcttctacg gtggttgtgg tggttaacaga 120  
aacaacttcg acactgagga gtactgtatg gctgtttgtg gttctgctat ttaa 174

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<210> 28  
<211> 30  
<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 28  
ggaattccat atggcacagg ttctcagagg 30  
  
<210> 29  
<211> 24  
<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 29  
ccaatgcatg tcatcttc cagc 24  
  
<210> 30  
<211> 24  
<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 30  
ccaatgcatc cggacttctg cctg 24  
  
<210> 31  
<211> 24  
<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 31  
ccaatgcatt cattttgtgc attc 24  
  
<210> 32  
<211> 27  
<212> DNA  
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<220>  
<223> primer  
  
<400> 32  
acgcgtcgac ttaagcacca ccgcaag 27  
  
<210> 33  
<211> 29

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<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 33  
acgcgtcgac ttaggttcca taatttatcc 29  
  
<210> 34  
<211> 30  
<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 34  
ggaattccat atggcttaca accgtctgtg 30  
  
<210> 35  
<211> 27  
<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 35  
cgggatccga tgcaagcgta-gaagcag 27  
  
<210> 36  
<211> 26  
<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 36  
cgggatccgc acaggttctc agaggc 26  
  
<210> 37  
<211> 29  
<212> DNA  
<213> Artificial  
  
<220>  
<223> primer  
  
<400> 37  
acgcgtcgac ttagtcatct tctccagcg 29  
  
<210> 38  
<211> 31  
<212> DNA  
<213> Artificial

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<220>  
<223> primer designed for generating PCR fragment of interest for cloning into vector pPIC9

<400> 38  
ccgctcgaga aaagagcaca ggttctcaga g 31

<210> 39  
<211> 33  
<212> DNA  
<213> Artificial

<220>  
<223> primer designed for generating PCR fragment of interest for cloning into yeast expression vector pPIC9

<400> 39  
ataagaatgc ggccgcttaa atagcagaac cac 33

<210> 40  
<211> 24  
<212> DNA  
<213> Artificial

<220>  
<223> primer designed for generating PCR fragment of interest for cloning into yeast expression vector pPIC9

<400> 40  
cgcgatatca tcttctccag cgag 24

<210> 41  
<211> 20  
<212> DNA  
<213> Artificial

<220>  
<223> primer designed for generating PCR fragments of interest for cloning into yeast expression vector pPIC9

<400> 41  
gaggtttgtt ctgagcaagc 20